National Aeronautics and Space Administration

Objectives for Human Missions to NEOs

Precursor Group 1

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Deep Space Capabilities Theme: Key Observations

- Objectives
  - Demo human tolerance for extended missions
  - Determine potential resource utilization characteristics
  - Demo tele-operation
- Activities
  - Sampling
  - Construct infrastructure
  - Demo autonomy and light time delay
  - Demo tools for deep space use
- Target Characteristics
  - Extended mission duration in deep space
  - Water rich target
  - Larger than 50 meters
  - Short mission time
  - Slow rotation

Scientific Research Theme: Key Observations

- Objectives
  - Determine History and origin of NEO's/ composition/ structure
  - Sample return
  - Understand frangibility and behavior in microgravity
- Activities
  - Conduct in-situ spectrometry
  - Emplace long-term observatory (space weather)
  - Intelligent human sample selection and placement of geophysical experiments
- Target Characteristics
  - Larger, water rich, containing rubble pile
  - Binary, if possible

Planetary Defense Theme: Key Observations

- Objectives
  - Don't take a non-threatening asteroid and turn onto a hazardous course
  - Demo ability to modify delta V
  - Determine structure and composition
  - Understand fragility and breakup potential
- Activities
  - Emplace sensors
  - Emplace delta V device
  - Demo mitigation concept
- Target Characteristics
  - Select NEO representative of most likely statistical threat

Backup

Magnitude of Findings

Theme	Number of Objectives
Demonstrate Deep Space Capabilities	
Scientific Research	
Planetary Defense	
Other	

- Overarching observations

Parking Lot

- Precursor missions: 1) telescopic recon, 2) in-situ spacecraft
- Dust/regolith properties as they relate to safe-operations

Possible Breakout Discussions for Tomorrow

- Optional Chart